Limestone Islands Provincial Nature Reserve

Management Plan

Ontario

Ministry of Natural Resources

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Minister

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Deputy Minister

3645

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Cover: Caspian Terns (*Hydroprogne caspia*), South Island

APPROVAL STATEMENT

The Limestone Islands have long been recognized as important seabird breeding grounds, supporting large colonies of Caspian terns which are rare in Canada and common terns which are in decline throughout the Great Lakes. The isolation of these two small islands provide solitude for nesting purposes. To minimize disturbances during the breeding season, these islands have been put under regulation of the Provincial Parks Act as a Nature Reserve to ensure the survival of the tern colonies.

"We are pleased to approve the Limestone Islands Nature Reserve Provincial Park Management Plan as official policy for the management and development of this park. The plan reflects this Ministry's intent to protect natural and cultural features of the Limestones and maintain and develop low-intensity opportunities for heritage appreciation for both residents and visitors to the Province."

R. M. Christie
Regional Director
Algonquin Region

Director, Parks and
Recreational Areas Branch

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APPENDICES

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APPENDIX II: Recorded Birds of the Limestone Islands Nature Reserve

Above: Typical Shoreline, South Island

Below: Limestone Blocks & Modern Cobble Beach, North Island

1.0 INTRODUCTION

Limestone Islands Provincial Nature Reserve is the most remote of Georgian Bay's 30,000 Islands. Limestone Islands are located approximately 40 kilometres west of Parry Sound by boat (Figure 1). These islands, comprised of limestone bedrock, are entirely different from the rest of the 30,000 Islands which are typified by barren granite bedrock and wind-swept pines. The total area regulated is 450 hectares +/-, yet the two main islands total less than 25 hectares. The Park also includes a distance of 400 metres from the shore of all islands.

The two main islands are essentially low, flat lying shelves dominated by level expanses of barren, pitted limestone, with the interior of the islands being largely cobble meadow.

The Limestone Islands support a rich natural and cultural heritage. Many of these resources are significant on a provincial, and possibly at a national level. The concentration of all these features on such a small and isolated land mass adds greatly to the value of the site.

The most significant feature on Limestone Islands is the seabird colonies, (Figure 2) specifically those of the Caspian tern (Hydroprogne caspia) and common tern (Sterna hirundo). The islands support a large colony of caspians which are rare in Canada, thus making this colony nationally significant. Although the common tern is in decline through the Great Lakes, a large, new colony has been established here. Given their widespread decline, this new colony is provincially significant. Ring-billed gulls (Larus delawarensis) number in the thousands on the Limestones. Here, as elsewhere in the Great Lakes, this species has undergone a population explosion. This is unfortunate for the smaller common tern who must compete for nesting sites as well as food and even for the Caspians whose nesting knolls are surrounded by gulls.

The Limestones, being the only islands to have limestone bedrock in the 30,000 Islands chain, have one of the best exposures of the Lower Bobcaygeon Formation in this province. These Middle Ordovician rocks are well exposed as a limestone pavement, revealing in fossil form such early life forms as horn corals, large cephalopods and trilobites. Yet the Wallis Rocks, which lie just offshore, are ancient Precambrian granite indicating the presence of a geologic contact and unconformity.

Another significant feature of the Limestones is the cobble beach ridges (Figure 3). These relict beaches may record evidence of glacial Nipissing Lake and thus could be regionally significant. An excellent modern cobble spit on the North Island is regionally significant.

The vegetation of the islands is also important. The flora is an unusual mixture of alien weeds, garden escapes, calcareous species, Georgian Bay specialties, as well as both southern and boreal plants. This odd mixture is accounted for in part by the isolated nature of the islands, their latitude, and their exposed bedrock. A total of 149 plants have been identified.

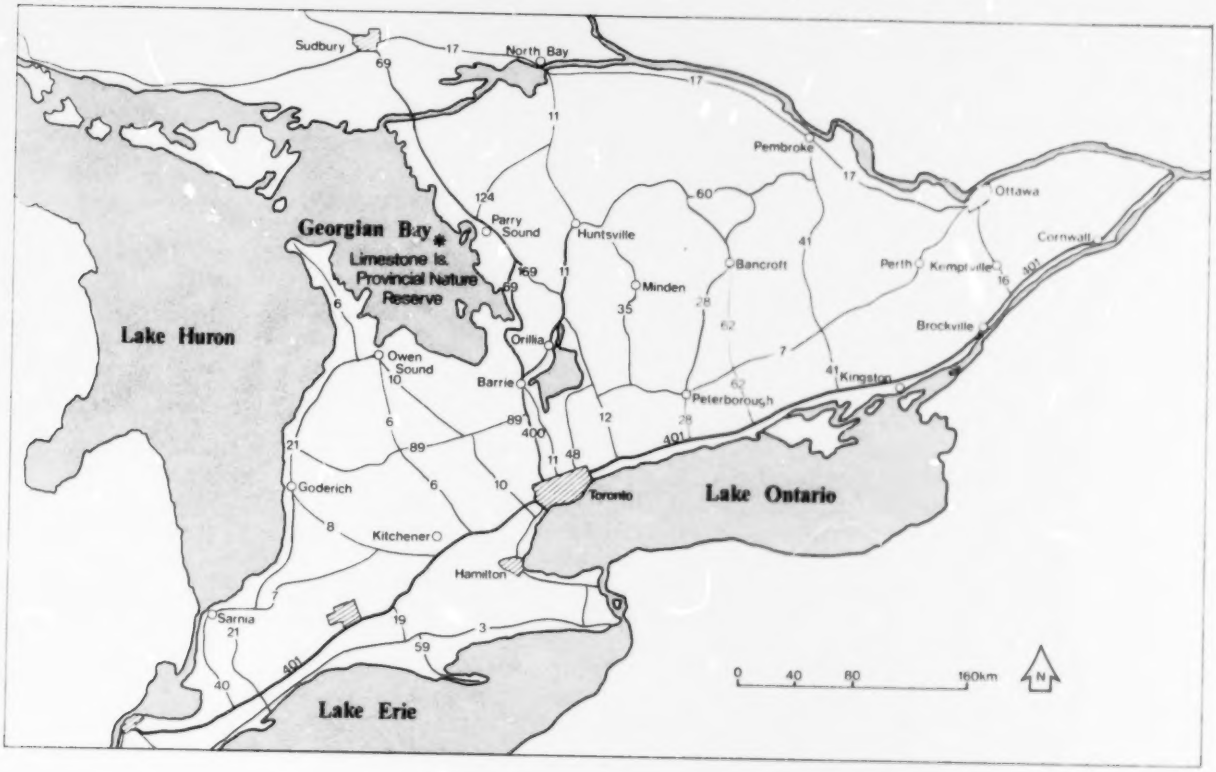
The waters of Georgian Bay exert a moderating influence on the local climate. Some southern species are reaching the northern limit of their range and are rare in the Algonquin Region. These include plants such as porcupine sedge (Carex hystricina) and knotweed (Polygonum ramossissiuum). Tree cover which is restraicted to the north island consists, of white cedar (Thuja occidentalis), green ash (Fraxinus pennsylvanica var. subintegerrima) and poplar (Populus balsamifera). Where soil has developed on the interior of the islands, dense low thickets occur.

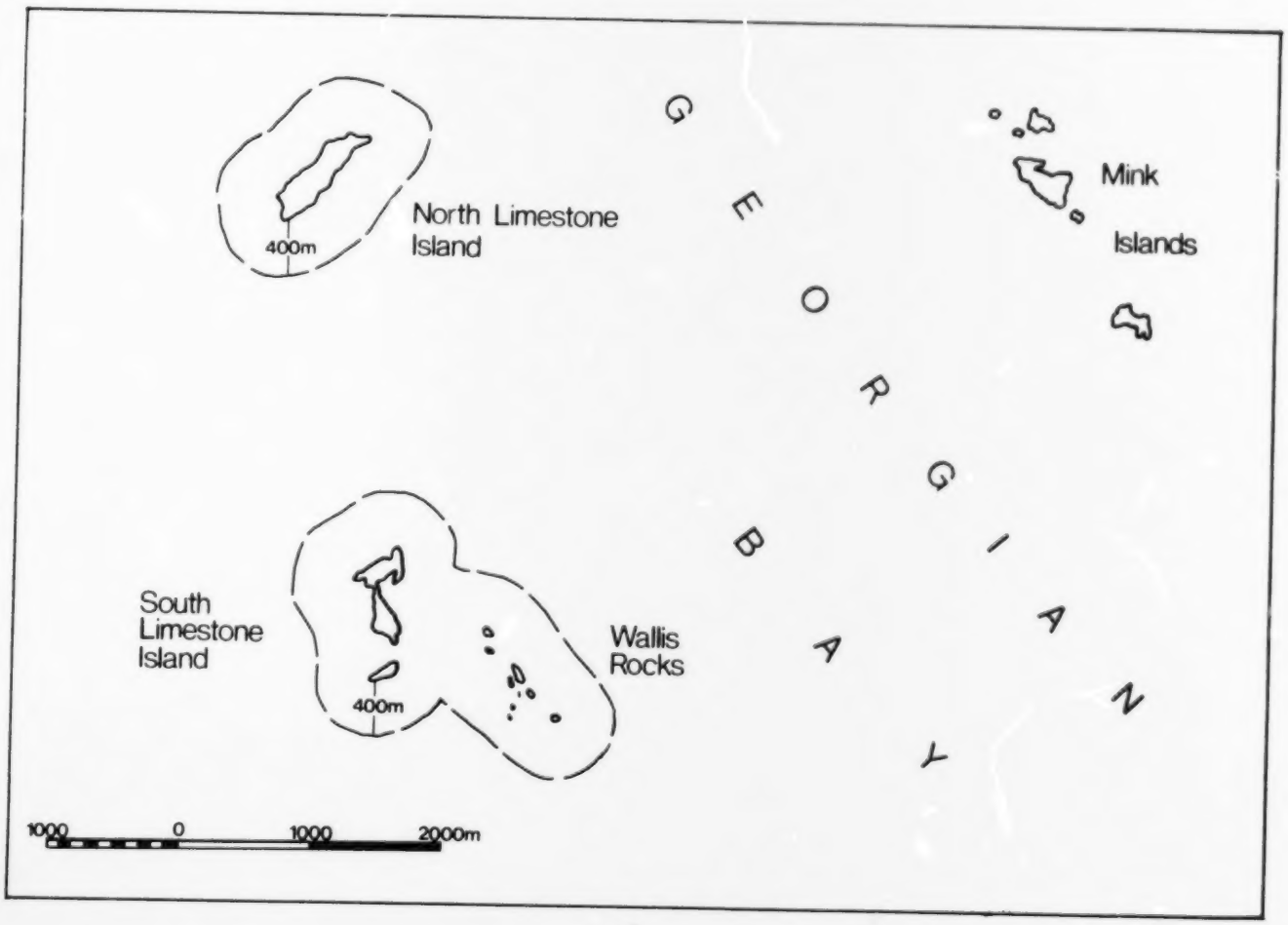
While the earth and life science values of the Nature Reserve are exceptional, the cultural resources have proven to be extremely significant as well. First discovered by Parry Sound District Ministry staff, a number of large depressions (Figure 3) in the oldest beach ridges have revealed Indian occupation of the islands. Further research is needed to determine the full significance of the site.

The earth and life science and cultural resource values combine to give the Limestone Islands a special place in the Provincial Park System.

Figure 1

REGIONAL CONTEXT





2.0 SUMMARY OF SIGNIFICANT ISSUES

- The principal issue is to protect the terns by maintaining natural conditions while allowing the few visitors who wish to visit the islands to learn about the seabirds. While an interest in the nesting seabirds is what attracts most visitors to the islands, the terns cannot tolerate the pressure of people near their colonies while they are incubating or rearing young chicks.

- The ring-billed gull colony (up to 1984) was rapidly taking over the common tern nesting area at the rate of 50 to 75 cm a year.

- There is a need to protect the highly sensitive beach ridges and the superior exposures of fossils.

3.0 PARK CLASSIFICATION

The Limestone Islands were put into regulation in May 1980 (O. Reg. 336), and have been designated a Nature Reserve classed park to protect the many significant resources found there. Nature Reserves are areas selected to represent distinctive or special natural and landform features of the province. These reserves are protected for scientific and educational purposes and as gene pools for research to benefit present and future generations.

4.0 PARK GOAL

The goal of Limestone Islands Provincial Nature Reserve is to ensure the protection and perpetuation of the island's significant natural and cultural features, including the seabird colonies, the fossil exposures, the beach ridges, and any evidence of previous human occupation for scientific research, environmental education and limited natural history interpretation.

5.0 PARK OBJECTIVES

Limestone Islands contribute to the achievement of the following two objectives of the Provincial Parks System for Nature Reserves.

5.1 Protection Objective:

> To protect a system of provincially significant, special and representative earth and life science features.

The Limestone Islands Nature Reserve will protect the seabird colonies, the fossil exposures, the beach ridges, the island ecosystem and any evidence of previous occupation. These significant features will be protected primarily by minimizing human disturbance of the site.

5.2 Heritage Appreciation Objective

> To provide opportunities for unstructured individual exploration and appreciation of the earth and life science heritage of Ontario.

The Limestones will provide opportunities for the exploration and appreciation of an unusual natural environment during the late summer and early fall when the seabirds have completed nesting.

> To provide opportunities for exploration and appreciation of natural environments through interpretation and education based upon the character and significance of Nature Reserves.

Interpretation and education programs for the Limestone Islands will be carried out primarily off-site. Limited interpretation will take place on the islands themselves.

6.0 ZONING

The entire area will be designated Nature Reserve zone to ensure full protection of the islands' resources. The policies and regulations governing the management of Nature Reserve zones require that the site will be maintained in as natural a state as possible, with minimal development for interpretive and educational purposes.

A boat and seaplane landing area will be designated on the south island. However, it will not be considered an access zone, but instead, as part of the Nature Reserve zone.

7.0 RESOURCE MANAGEMENT POLICIES

The primary goal of any management policy is to protect the fragile resources of the Nature Reserve by maintaining the area in as natural a condition as possible. It is the remote, isolated nature of the Limestones that has allowed their special features to develop and endure. Management policies will strive to maintain this remoteness by minimizing disturbance of the site. Excessive disturbance will destroy the very resources for which the islands were set aside.

7.1 Landforms

7.1.1 Beach Ridges

The beach ridges are highly sensitive to disturbance. Beach ridges are uncommon along the eastern shoreline of Georgian Bay, and those on the Limestones are particularly well developed. On the North Island the ridges merge to form a gravel and cobble spit. The ridges are composed of loose gravel and cobbles which are easily disturbed, particularly by storms.

In terms of management, materials are not to be transferred or removed from the beach ridges or spit. Prior to any further archaeological studies on the pits in the relict or older beach ridges, the elevation of these ridges should be accurately determined. The evaluation of the beach ridge could assist future researchers in determining the age and relationships of these beach ridges to others in the Lake Huron basin.

Efforts will be made to maintain the ridges intact.

7.1.2 Fossils

Given the importance of this exposure of the lower Bobcaygeon Formation, no collecting of fossils will be permitted except for scientific purposes with the written approval of the Ministry of Natural Resources. Uncontrolled collecting could result in the loss or damage of important fossils. A standard set of fossils for the Limestones will be kept at the Royal Ontario Museum. The islands will serve as an on-site museum for the fossils. A notice at the interpretive display will strongly indicate collecting is not permitted here.

7.2 Vegetation

Vegetation on the islands will be allowed to develop naturally. There will be no clearing of vegetation nor the introduction of any species which is not already present.

There will be no cutting of trees on the islands. The sparse tree growth regenerates very slowly, if at all. The trees provide much needed shelter and nesting sites for wildlife. Dead trees will be allowed to remain standing as they provide wildlife habitat.

7.3 Wildlife

7.3.1 Bird Colonies

The bird colonies (Figure 2) are undoubtedly the most fragile resource on the islands. They are also one of the most significant features.

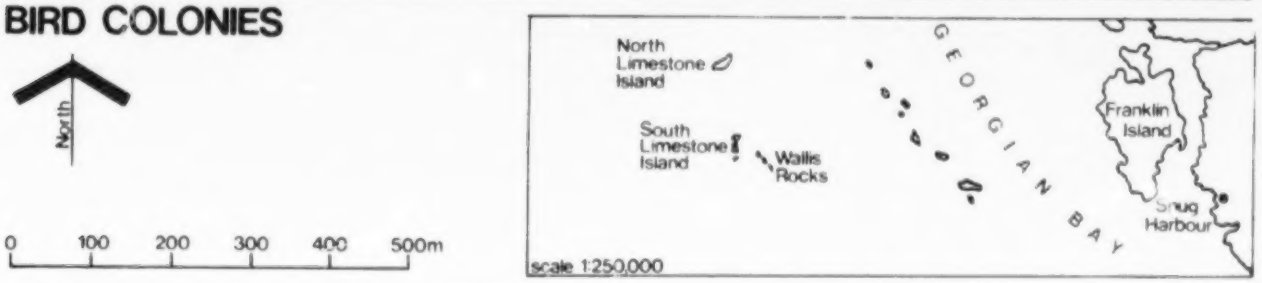
During the nesting season, the bird colonies are extremely sensitive to human interference. Even walking near nesting areas can cause severe disruption, resulting in large losses of eggs and young. The most sensitive colonies are those of the Caspian and common terns.

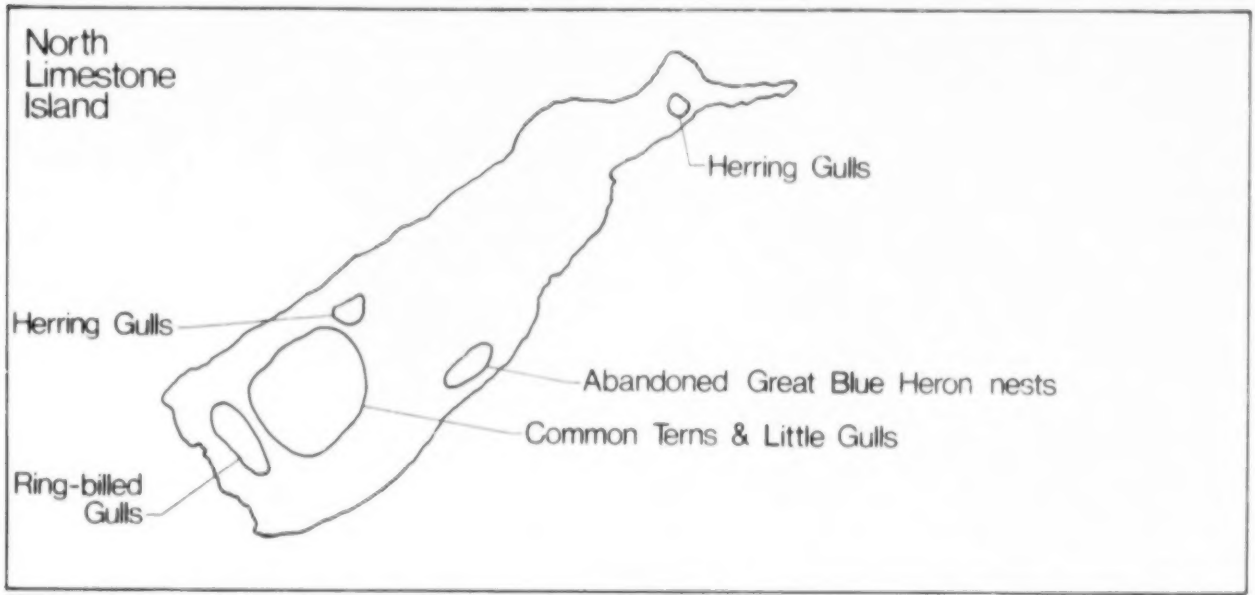
The Caspians nest on the northern portion of the south island on a large and a smaller secondary knoll. These terns are so sensitive to disturbance that they nest only on remote islands. Minimal disruption can cause total desertion of the colony. During 1980 and 1981 the Caspians nested only on the large knoll, however, in 1982 the small secondary knoll was reoccupied. Again in 1983 the small secondary knoll was abandoned. This situation needs to be closely monitored.

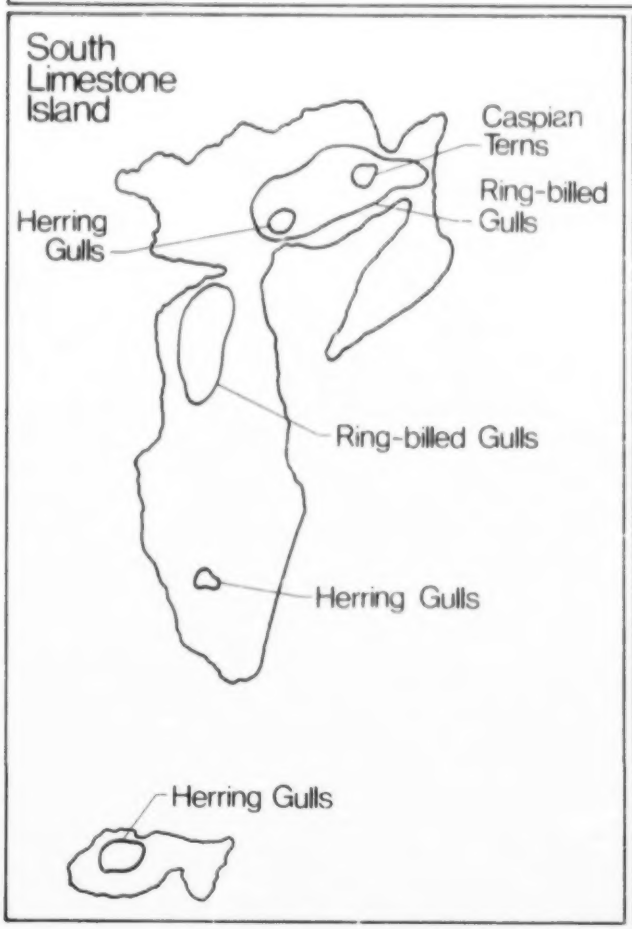
On the west end of the North Limestone Island, a new colony of common terns and

Figure 2

BIRD COLONIES







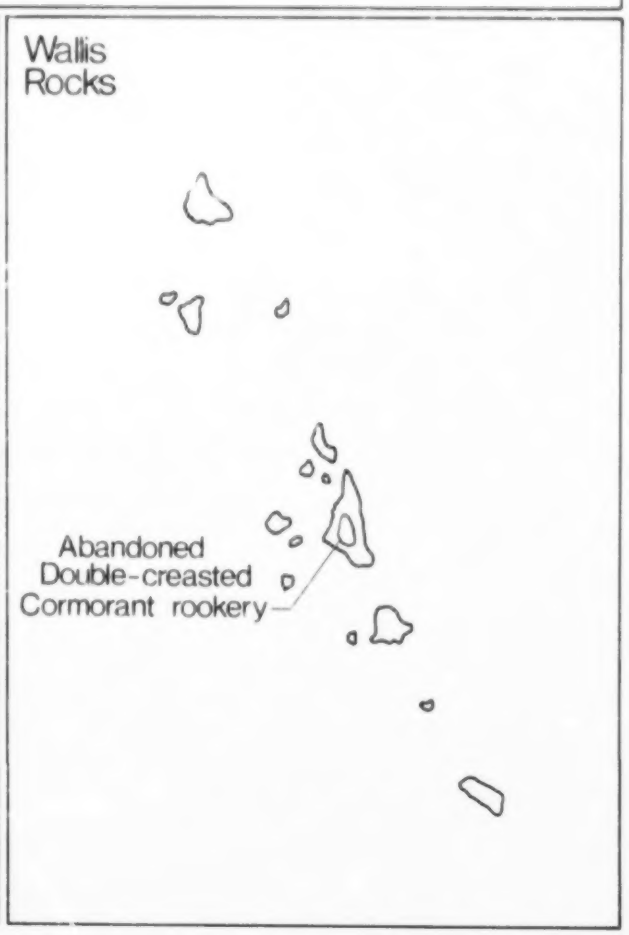
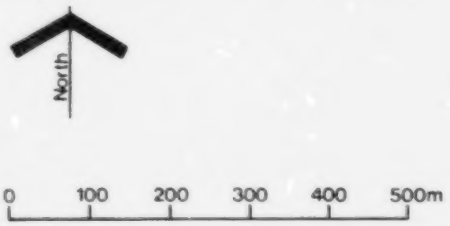
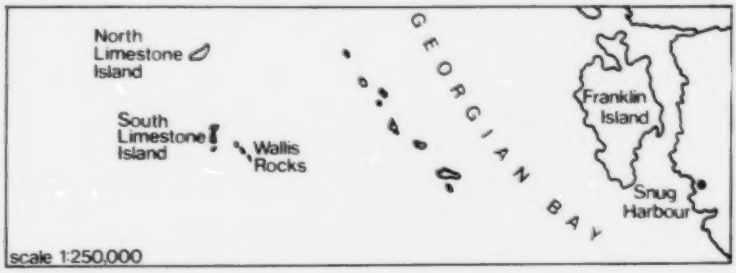
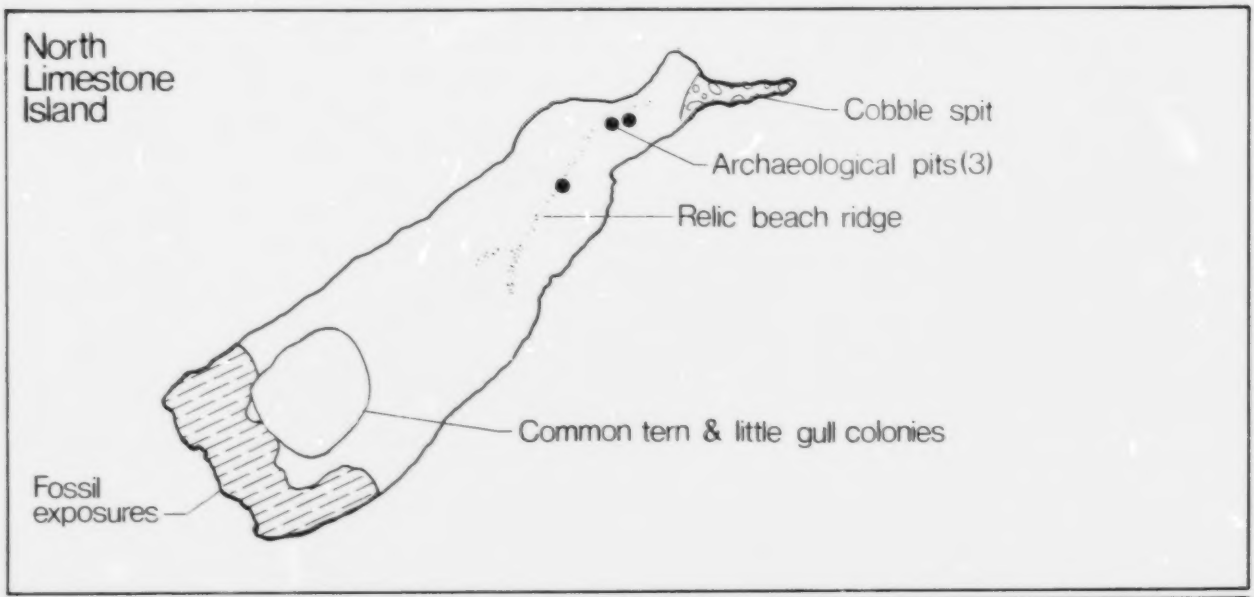


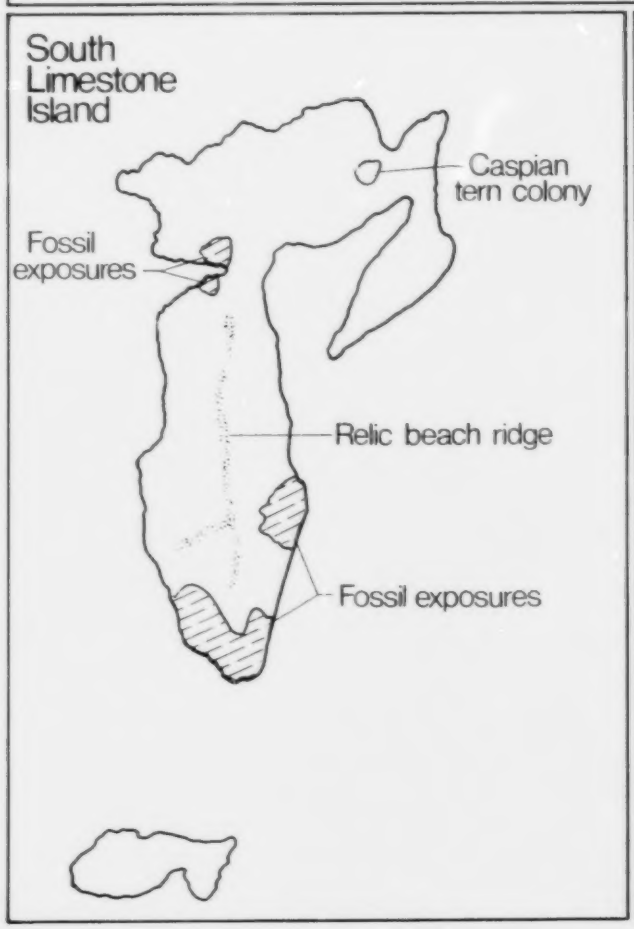
Figure 3

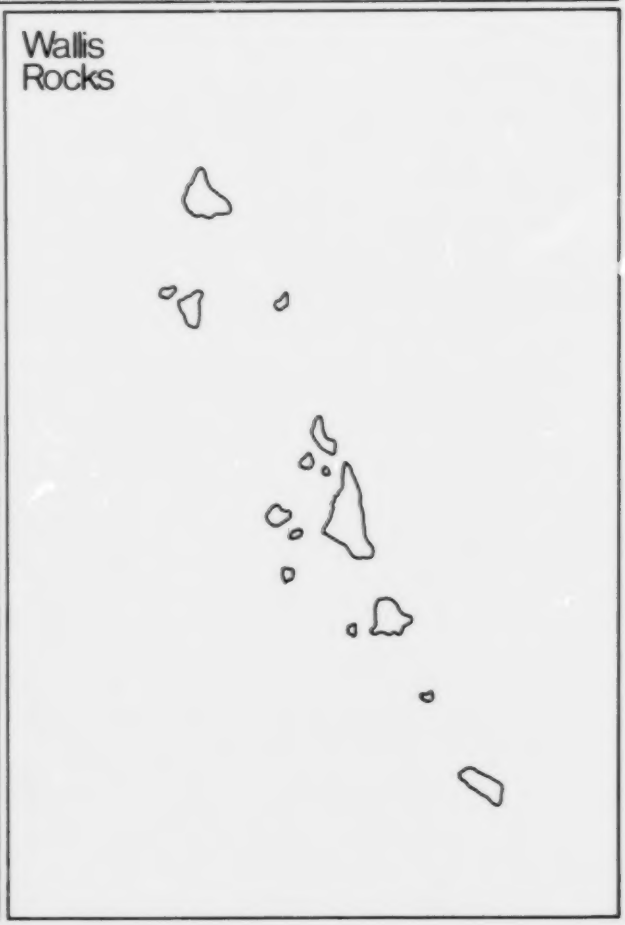
SIGNIFICANT FEATURES











little gulls (Larus minutus) have recently taken residence. The common tern colony is especially important as these birds recently abandoned a large nesting site on the south island because of intense pressure from ring-billed gulls.

Seabirds habitually return to the same nesting site each year, once the colony has been firmly established. However, the tern colony has only existed since 1978, and any disturbance could cause total desertion. Long term declines in numbers of common terns suggests that the species is in serious trouble on some of the Great Lakes. The new colony is thus extremely significant. The Canadian Wildlife Service has recommended that larger and more permanent locations of common terns be protected. Monitoring of ring-billed gull populations on the North Island should be carried out.

Access to the Caspian and common tern and little gull colonies will be restricted, during the entire nesting season, from May 1st to August 1st.

No domestic animals will be permitted on the islands at any time and will be immediately removed if found there. The seabirds nest directly on the ground thus making young chicks vulnerable to harassment by both dogs and cats.

Biologists who have traditionally monitored the bird populations will be encouraged to continue this work.

A management strategy will be developed by the Ministry of Natural Resources in conjunction with the Canadian Wildlife Service and interested universities. The main objective of such a strategy will be to maintain the Caspian and common terns and the little gull colonies. It should also determine ways to:

a) guard against sudden population declines of Caspian and common terns

b) control ring-billed gull encroachment on the common tern colony on the North Limestone Island

c) control excessive human disturbance of the colonies.

7.3.2 Fauna

Many other birds nest here including herring gulls, kingbirds, pintails, common and red-breasted mergansers, killdeers, spotted sandpipers, tree swallows and red-winged blackbirds. During migration the islands are a popular stopover. A total of 106 bird species have been recorded here.

A surprising variety of mammals, reptiles and amphibians have managed to reach the islands. Meadow voles, beaver, raccoon, silver-haired bat, red fox, white-footed mouse, northern water snake, DeKays snake, eastern garter snake and American toad are a few which have been reported. A massasauga rattlesnake was seen in 1981.

No new species, whether native or alien, will be deliberately introduced. Island ecosystems are very fragile and have developed their own special blend of species which can be easily disrupted by the rapid spread of a new plant or animal. Even native species which are not already present could cause severe changes in the deliberate balance of the island ecosystem.

Animal populations may be controlled when essential to protect the ecosystems within the Limestones for which the Nature Reserve was established. Techniques will be used (i.e. removing of ring-billed gull clutches from nests encroaching on the Caspian tern colony) having minimal effects on other components of the Park's environment.

Commercial trapping will not be permitted. Collecting for scientific purposes must be authorized by the Ministry of Natural Resources and the Federal government who issue Migratory Bird Collecting Permits.

Sport hunting will not be permitted.

7.4 Fisheries

Sport fishing and commercial fishing, including commercial bait fishing, will not be permitted within the 400 metre boundary limit surrounding each island.

7.5 Historical and Archaeological Featu es

Further research is needed on the historical and archaeological features of the Limestones. Any potential sites or artifacts will not be disturbed until these studies can be completed. However, should Ministry of Natural Resources' staff encounter artifacts lying on the surface, these will be removed and stored in the District Office at Parry Sound until required by researchers. The location of the find will be recorded on maps at the District Office. A historical and archaeological management plan will be drawn up based on the results of this research. The plan will discuss any necessary on-site management, as well as storage and display of any artifacts.

7.6 Fire

The Limestones limited geographic area and fragile environment makes the area extremely sensitive to fire. A surface fire would destroy the ground bird colonies and a deeper-burning fire, caused by a prolonged dry spell, could destroy the already thin layer of soil.

Any fire on the Limestones will be aggressively suppressed in accordance with Ministry of Natural Resources' fire policy. Fire suppression techniques will be modified to minimize the adverse effects on the environment.

A specific fire suppression plan will be developed.

No fires of any type will be allowed on the islands.

7.7 Lands and Waters

The lands and waters within the reserve will be managed to maintain the area in as natural condition as possible. Extraction of minerals or gravel will not be permitted. Solid waste will be disposed of outside the reserve.

No federal, provincial or local government agency, or private firm shall use the islands as installation bases for communications equipment such as towers, navigation aids or other facilities.

Motorized vehicles, including trail bikes, all-terrain vehicles and snowmobiles will not be permitted on the islands.

7.8 Access

The Nature Reserve can be reached by boat, float plane or helicopter. Boats will be permitted to land only at the designated landing site on South Limestone Island. The site is located far enough away from the seabird colonies so that disturbance should be minimal. During breeding season, access beyond designated access points will not be permitted.

Float planes will also be allowed to moor only at the designated landing site. Low flying planes or helicopters will not be permitted over the islands during the nesting season from May 1st to August 1st, except for the purpose of fire control and other emergencies. Landing will require specific authorization from the Ministry of Natural Resources at Parry Sound.

8.0 OPERATIONS POLICIES

8.1 Visitor Services

The Visitor Services program on the Limestones is designed at a basic level to accommodate the use the islands now receive. The program strives to direct this use in such a manner that the resources of the area can be appreciated, without being unduly disrupted. The program is not designed to promote increased use of the islands, as any increased visitation would threaten the very resources the islands were set aside to protect.

The Visitor Services program will primarily involve low key off-site interpretation and distribution of information.

8.1.1 Information

It is essential that the islands maintain a very low profile within the parks program. Publicity should be kept to a minimum and the islands must not be

treated as a tourist attraction. Information should be distributed only in response to specific inquiries. The Limestone Islands Nature Reserve may be discussed in interpretive programs in other provincial parks such as Killbear, but the subject of human disturbance and its effect on the significant natural features of islands should be forcibly stressed. Visitation to the islands should also be discouraged.

An information package will be developed for local cottage associations, groups, researchers and visitors who inquire about the reserve. The package will give general information about the islands stressing their significance and sensitivity and to discourage visitation. The policies and regulations governing the use of the Nature Reserve will also be explained as will any visitor hazards such as the shoals which create unsafe mooring conditions.

8.1.2 Interpretation

The interpretive program on the Limestones will be very low profile, designed for low intensity self-use and oriented towards small family groups. The interpretive facilities will be located at the designated landing area on the South Island and will consist of a permanent small kiosk or display case.

The displays will concentrate on:

- o the natural and cultural resources (seabird colonies, island ecosystems, fossil exposures, bedrock and surficial geology and human history) stressing the significance and sensitivity of these features;
- o outlining any visitor hazards such as unsafe mooring, poison ivy, stinging nettle and rattlesnakes;
- o outlining the purpose or goal of the Limestone Islands Nature Reserve;
- o giving the policies and regulations governing the use of the Nature Reserve.

The permanent display and all other signs except warning signs will be designed to harmonize with the landscape.

8.1.3 Recreation

Recreational use of the Limestone Islands will not be promoted. Recreation on the islands will be limited to low-intensity day use activities, preferably after the nesting season. The nesting season occurs between May 1st and August 1st.

Visitors may enjoy passive activities such as walking, picnicking, painting, photography and nature appreciation in designated areas only.

8.2 Research

Scientific research on certain aspects of the reserve will be encouraged. More data is required on the beach ridges, flora and fauna, historical paleontological and archaeological resources, and the islands' ecosystem.

All research must be approved by the Ministry of Natural Resources and comply with its policies and guidelines. Researchers will have to submit a written proposal fully describing the purpose of the study, avenues and methods of study and the type of knowledge that will advance the state of the science. All collecting requires a permit and a knowledgeable Ministry of Natural Resources' staff member should be present to record and monitor the actual sample taking. Accurate documentation of sample locations and types should be submitted by the researcher. A copy of all lab tests, results, reports, and other documentation should also be submitted to Ministry of Natural Resources' District Office at Parry Sound.

Temporary research facilities may be erected only at the designated landing area. No clearing of vegetation will be permitted. Any such facilities should not disturb the islands' environment, and will be removed upon completion of the research.

Scientific research on the islands must be carefully controlled. Studies should be carried out on the islands only if they cannot be performed elsewhere. All researchers should be well informed about the purpose of the Nature Reserve and the sensitivity of its resources. They should be cautioned about disturbing any of the islands' significant features.

Research privileges will be revoked if excessive disturbance occurs. There will be no research conducted during the nesting season, unless the birds themselves are being studied.

Research on the bird colonies should concentrate on monitoring population fluctuations. Research methods which are highly disruptive to the significant species will be prohibited. These include excessive collecting of eggs or birds, and cannon netting of nesting birds.

The fossils have been briefly studied in 1969 and 1979 by Dr. D.H. Collins, Curator of Invertebrate Palaeontology at the Royal Ontario Museum. The specimens collected are kept at the R.O.M. Perhaps a standard set could be established containing samples obtained from known stratigraphic locations which are thoroughly documented and oriented. Such a sample set could be utilized by other researchers and would minimize the number of additional fossils to be collected. It is recommended that the R.O.M. be established as a permanent storage area for specimens from the Limestones. Here specimens would be easily accessible and hopefully duplicate collecting by other agencies would not be necessary and aggressively discouraged.

8.3 Tours and Group Use

Organized tours to the Limestones will be carefully controlled. The islands should not be considered a tourist attraction, and only small, responsible groups with a specific interest in the area will be permitted. All groups will inform the Parry Sound District Office of their intention of going to the islands. Tours will be discouraged during the nesting season between May 1st and August 1st and permission will be granted only if the cause of the visit is justified by the District Office. A Ministry of Natural Resources official familiar with the fragility of the islands' resources will accompany any tours. Groups will be well informed of the rules and regulations governing the use of the Nature Reserve.

Tours to the islands will be closely monitored, and if any adverse impacts are detected, this use will be severely restricted. If any research group studying the seabird colonies sets up a season long camp, they will be asked to keep a record of all visitors to the island and their place of origin.

8.4 Staffing Requirements

No full-time or part-time staff will initially be assigned to the Limestone Islands Nature Reserve. However, the islands will be periodically checked during the summer months to ensure that Nature Reserve regulations are being followed. If possible the islands will be checked at least on the holiday weekends during May through August, particularly if boating conditions are good on those dates. These checks will be made by Ministry of Natural Resources' staff such as conservation officers on fishing patrols or provincial parks personnel. Minor maintenance may be necessary on the signs and interpretive kiosk, to clean up litter and to monitor visitor use. Any visitor comments on the new signs and display should be recorded.

If visitor use of the site becomes excessive, then closer supervision will be necessary to prevent irreversible damage. Funding would then be required for a more detailed program and interested organizations such as the Federation of Ontario Naturalists may be approached regarding volunteer assistance.

The installation of signs and an interpretive kiosk should eliminate the need for staffing most of the time. However, if researchers are stationed on South Limestone Island for a field season, perhaps they could act as interpreters at least on holiday weekends. These volunteers could explain how easily the birds are disturbed, and why the terns need such an isolated location to nest successfully. They would be able to provide much more information than the kiosk and signs and most importantly, maintain a custodial presence on the Limestones.

9.0 DEVELOPMENT POLICIES

The purpose of this section of the plan is to establish the basic framework for the development of on-site and any related off-site systems and facilities.

In keeping with the primary goal of the management strategy for the Limestones which is to maintain the islands in as natural a condition as possible, development in the Nature Reserve will be low key and only involve the placing of signs indicating that the site is a provincial park, warning signs and one information kiosk.

9.1 Signs

At least two signs indicating that the area is a 'Provincial Nature Reserve' are required to inform visitors of the legal, and protected status of the features in the reserve. These signs are critical as they represent Ministry of Natural Resources' best opportunity to inform visitors of the legal status of the reserve. One sign should be placed at the best landing area (Figure 4) on North Limestone Island and could be combined with a welcome sign along with directions to the designated landing area on South Limestone Island. The other sign should be at the designated landing area on South Limestone Island and include the following: "Landing Site: approach with caution".

Special signage is needed to discourage visitors from entering the bird colony areas on both the North and South Islands. These signs should be erected in the locations identified on Figure 4 and have the following wording: "Research has proven that human presence in seabird colonies located beyond this point could cause death to seabird chicks."

As indicated in Section 8.1.2 Interpretation, an information kiosk will be located at the South island landing site.

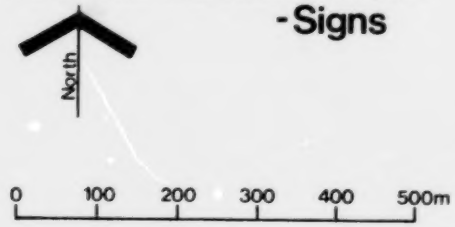
10.0 IMPLEMENTATION STRATEGY

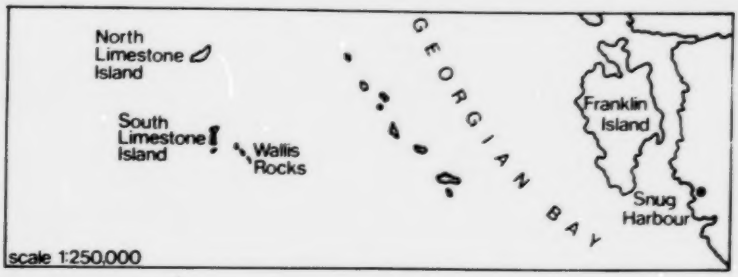
The following is a list of projects that have been previously described in this plan. This list appears in chronological order according to the individual projects priority. The number of projects to be completed or partially completed will be based on each year's funding.

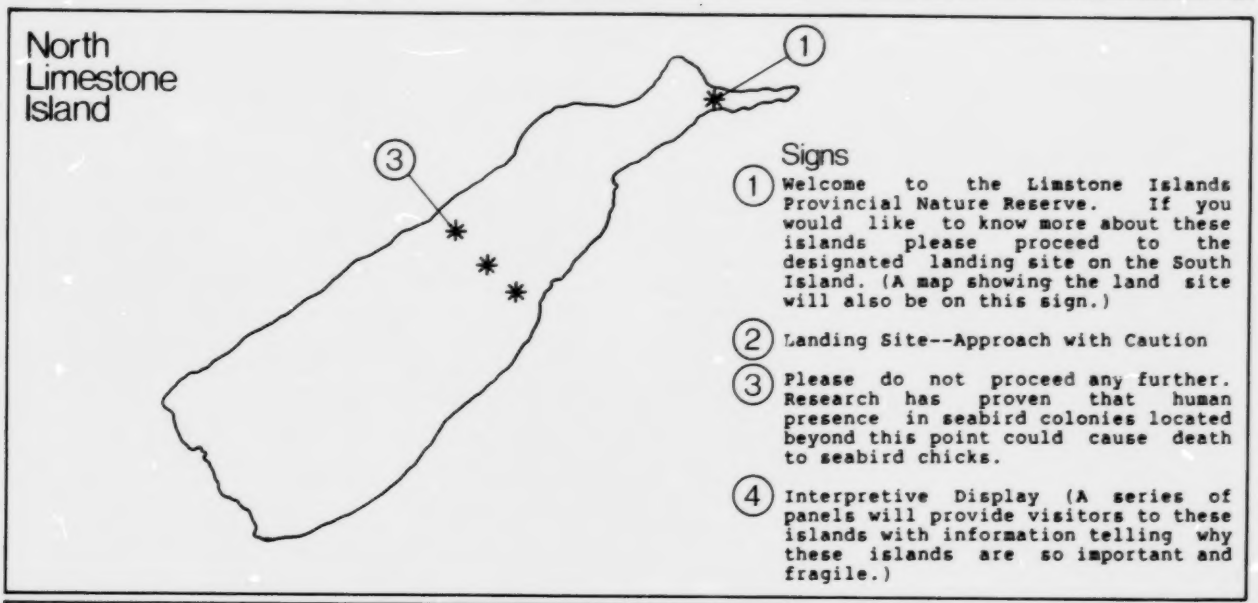
Priority Rating	Project Description
1	Develop a comprehensive signs plan and install signs as soon as possible - this includes an interpretive display (kiosk).
2	Monitor visitor use to determine level of disturbance, number of users, etc, ongoing.
3	Develop a control/ management program to protect the tern colonies with the Canadian Wildlife Service.
4	Encourage research on the tern colonies.
5	Develop a fire suppression plan which takes into account the fragility of the islands' resources.
6	Survey the elevation of the beach ridges and gravel spit prior to any further archaeological research (digs).
7	Develop an Historical and Archaeological management plan.
8	Develop a visitor services plan to utilize the services of volunteer interpreters such as the seabird researchers or groups such as the F.O.N. and to ensure the interpretive display is kept up-to-date.

Figure 4

FUTURE DEVELOPMENT -Signs

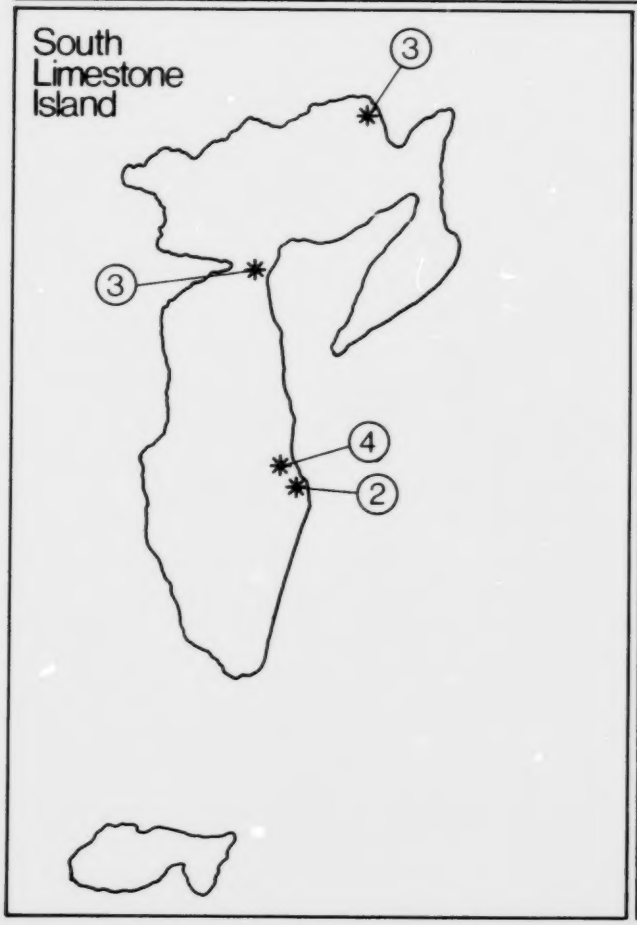


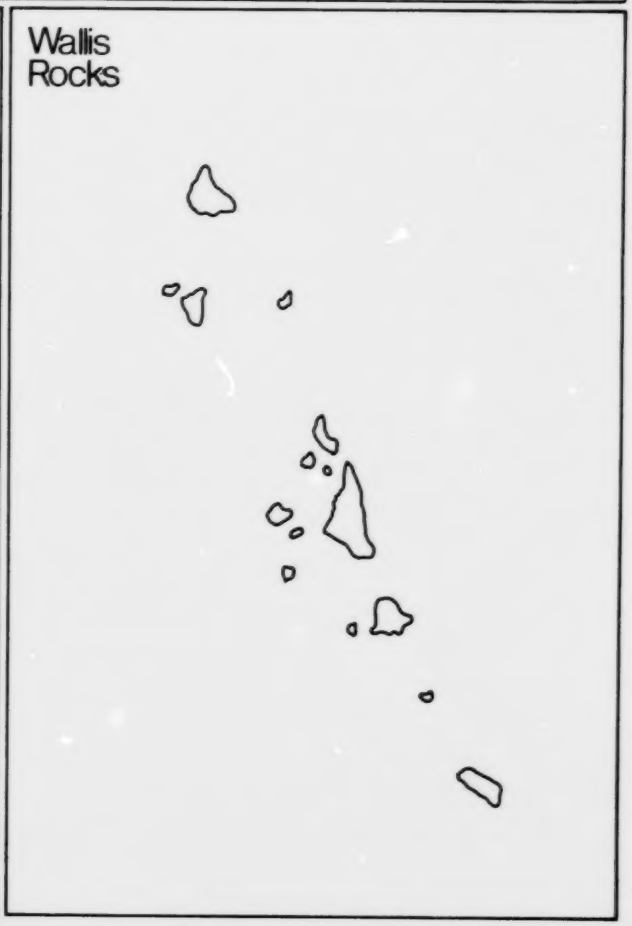




Signs

1. Welcome to the Limstone Islands Provincial Nature Reserve. If you would like to know more about these islands please proceed to the designated landing site on the South Island. (A map showing the land site will also be on this sign.)
2. Landing Site--Approach with Caution
3. Please do not proceed any further. Research has proven that human presence in seabird colonies located beyond this point could cause death to seabird chicks.
4. Interpretive Display (A series of panels will provide visitors to these islands with information telling why these islands are so important and fragile.)





11.0 PUBLIC CONSULTATION

A preliminary management plan was written and made available to naturalist groups, federal and provincial government agencies, involved educational institutions and local township offices to be reviewed and commented on. An open house was also held at the Parry Sound District Office. Comments received were favourable with most in agreement of what was being proposed.

12.0 REFERENCES

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Appendix I

Vascular Plants on the Limestone Islands (inc. Wallis Rocks)

AMARANTH FAMILY (Amaranthaceae)
Green Amaranth Amaranthus retroflexus

CASHEW FAMILY (Anacardiaceae)
Poison Ivy Rhus radicans L.
Sumac Rhus typhina L.

DOGBANE FAMILY (Apocynaceae)
Indian Hemp Apocynum sibiricum Jacq.

MILKWEED FAMILY (Asclepiadaceae)
Common Milkweed Asclepias syriaca L.

HONEYSUCKLE FAMILY (Caprifoliaceae)
Red-berried Elder Sambucus pubens Michx.

PINK FAMILY (Caryopyllaceae)
Thyme-leaved Sandwort Arenaria serpyllifolia L.
Field Chickweed Cerastium arvense L.
Chickweed Cerastium nutans Raf.
Sleepy Catchfly Silene antirrhina L.
Night-flowering Catchfly Silene noctiflora L.

GOOSEFOOT FAMILY (Chenopodiaceae)
Lamb's-quarters Chenopodium album L.

DAISY FAMILY (Compositae)
Yarrow Achillea millefolium L.
Common Ragweed Ambrosia artemisiifolia L.
Mayweed Anthemis cotula L.
Aster Aster pilosus Willd.
Bur-marigolds Bidens cernua L.
Beggar-ticks Bidens frondosa L.
Canada Thistle Cirsium arvense (L.) Scop.
Bull Thistle Cirsium vulgare (Savi) Tenore
Purple Boneset Eupatorium perfoliatum L.
Wild Lettuce Lactuca cannadensis L.
Pineapple Weed Matricaria matricarioides (Less.) Porter
Canada Goldenrod Solidago canadensis L.
Late Goldenrod Solidago gigantea Ait
Red-seeded Dandelion Taraxacum erythrospermum Andrez.
Common Dandelion Taraxacum officianale Weber
Goat's Beard Tragapogon major Jacq.

DOGWOOD FAMILY (Cornaceae)
Red Osier Cornus stolonifera Michx.

SEDUM FAMILY (Crassulaceae)
Mossy Sedum Sedum acre L.

MUSTARD FAMILY (Cruciferae)
Mustard Arabis divaricarpa Nels.
Tower Musard Arabis glabra (L.) Bernh.
Rock Cress Arabis hirsuta (L.) Scop.
Winter Cress Barbarea vulgaris R. Br.
Shepherd's Purse Capsella Bursa-pastoris (L.) Medic
Mustard Descurainia pinnata (Walt.) Britt.
Wormseed Mustard Erysimum cheiranthoides L.
Yellow Cress Rorippa islandica (Oeder) Borbas

SEDGE FAMILY (Cyperaceae)
Carex aquatilis Wahlenb
Carex bibbii Olney
Carex crawei Dewey
Carex hystricina Muhl.
Carex lasiocarpa Ehrh.
Carex stricta Lam.
Carex viridula Michx.
Eleocharis acicularis (L.) R. & S.
Eleocharis palustris (L.) R. & S.
Scirpus cyperinius (L.) Kunth.
Scirpus validus Vahl

HEATH FAMILY (Ericaceae)
Bearberry Arctostaphylos uva-ursi (L.) Spreng.

GERANIUM FAMILY (Geraniaceae)
Bicknell's Cranesbill Geranium bicknellii Britt.
Herb-robert Geranium robertianum L.

GRASS FAMILY (Gramineae)
Agropyron trachycaulum (Link) Malte
Agrostis alba L.
Agrostis scabra Willd.
Calamagrostis canadensis (Michx.) Nutt.
Calamagrostis neglecta (Ehrh.) Gaertn., Mey & Scherb
Deschampsia caespitosa (L.) Beauv.
Glyceria striata (Lam.) Hitchc.

Leersia oryzoides (L.) Sw.
Muhlenbergia frondosa (Poir.) Fern
Panicum flexile (Gatt.) Scribn.
Panicum lanuginosum Ell.
Panicum tuckermani Fern.
Phalaris arundinacea L.
Phleum pratense L.
Poa annua L.
Poa compressa L.
Poa palustris L.
Poa pratensis L.

ST. JOHNSWORT FAMILY (Guttiferae)
Hpericum kalmianum L.
Hypericum perforatum L.

WATER-MILFOIL FAMILY (Haloragaceae)
Myriophyllum exalbescens Fern

RUSH FAMILY (Juncaceae)
Juncus articulatus L.
Juncus balticus Willd.
Juncus dudleyi Wieg.

MINT FAMILY (Labiatae)
False Pennyroyal Isanthus brachiatus (L.) BSP.
Water Horehound Lycopus americanus Muhl.
Bugleweed Lycopus uniflorus Michx.
Wild Mint Mentha arvensis L.
Catnip Nepeta cataria L.
Satureja acinos (L.) Scheele
Basil Satureja vulgaris (L.) Fritsch
Smaller Skullcap Scutellaria parvula Michx.

PEA FAMILY (Leguminosae)
Vetchling Lathyrus palustris L.
Black Medick Medicago lupulina L.
White Clover Trifolium repens L.
Vetch Vicia americana Muhl.

LILY FAMILY (Liliaceae)
False Solomon's Seal Smilacina racemosa (L.) Desf.
Starry False Solomon's Seal Smilacina stellata (L.) Desf.

MALLOW FAMILY (Malvaceae)
Common Mallow Malva neglecta Wallr.

ASH FAMILY (Oleaceae)
Red Ash Fraxinus pennsylvanica Marsh

EVENING-PRIMROSE FAMILY (Onagraceae)
Fireweed Epilobium angustifolium L.
Northern Willow Herb Epilobium glandulosum Lehm.
Hairy Willow Herb Epilobium hirsutum L.
Narrow-leaved Willow Herb Epilobium leptophyllum Raf.
Downy Willow Herb Epilobium strictum Muhl.
Common Evening Primrose Oenothera biennis L.

PINE FAMILY (Pinaceae)
Common Juniper Juniperus communis L.
White Cedar Thuja occidentalis L.

BUCKWHEAT FAMILY (Polygonaceae)
Black Birdweed Polygonum convolvulus L.
Pale Smartweed Polygonum lapathifolium L.
Pennsylvania Smartweed Polygonum pennsylvanicum L.
Lady's Thumb Polygonum persicaria L.
Lady's Thumb Polygonum persicaria x punctatum
Polygonum punctatum Ell.
Knotweed Polygonum ramosissimum Michx.
False Buckweed Polygonum scandens L.
Rumex mexicanus Meisn.

PURSLANE FAMILY (Portulacaceae)
Purslane Portulaca oleracea L.

PRIMROSE FAMILY (Primulaceae)
Fringed Loosestrife Lysimachia ciliata L.

BUTTERCUP FAMILY (Ranunculaceae)
Columbine Aquilegia canadensis L.

TOUCH-ME-NOT FAMILY (Balsaminaceae)
Jewelweed Impatiens capensis Meerb.

ROSE FAMILY (Rosaceae)
Juneberries Amelanchier sp.
Crataegus punctata Jacq.
Common Strawberry Fragaria virginiana Duchesne
Ninebark Physocarpus opulifolius (L.) Maxim
Silverweed Potentilla anserina L.
Rough Cinquefoil Potentilla norwegica L.
Cherry Prunus pensylvanica L.F.
Cherry Prunus pumila L.
Cherry Prunus virginiana L.
Apple Pyrus malus L.
Swamp Rose Rosa palustris Marsh
Raspberry Rubus idaeus L.
Narrow-leaf Meadowsweet Spiraea alba DuRoi

BEDSTRAW FAMILY (Rubiaceae)
Bedstraw Galium trifidum L.

WILLOW FAMILY (Salicaceae)
Balsam Populus balsamifera L.
White Poplar Populus tremuloides Michx.
Beaked Willow Salix bebbiana Sarg.
Glaucous Willow Salix discolor Muhl.

Shining Willow *Salix lucida* Muhl.
Willow *Salix petiolaris* J.E. Smith

SAXIFRAGE FAMILY (Saxifragaceae)
Gooseberry *Ribes hirtellum* Michx.
Encrusted Saxifrage *Saxifraga aizoon* Jacq.

SNAPDRAGON FAMILY (Scrophulariaceae)
Small-flowered Gerardia *Gerardia paupercula* (Gray) Britt
Common Mullein *Vergascum thapsus* L.
Corn Speedwell *Veronica arvensis* L.
Purslane Speedwell *Veronica peregrina* L.

YEW FAMILY (Taxaceae)
Yew *Taxus canadensis* Marsh

CATTAIL FAMILY (Typhaceae)
Narrow-leaved Cattail *Typha angustifolia* L.

ELM FAMILY (Ulmaceae)
White Elm *Ulmus americana* L.

PARSLEY OR CARROT FAMILY (Umbelliferae)
Bulb-bearing Water Hemlock *Cicuta bulbifera* L.
Cow Parsnip *Heracleum maximum* Bartr.

NETTLE FAMILY (Urticaceae)
Slender Nettle *Urtica gracilis* Ait.

VERVAIN FAMILY (Verbenaceae)
Blue Vervain *Verbena hastata* L.

VIOLET FAMILY (Violaceae)
Northern Bog Violet *Viola nephrophylla* Greene

PONDWEED FAMILY (Zosteraceae)
Pondweed *Potamogeton foliosus* Raf.
Pondweed *Potamogeton natans* L.

Authorities are taken from Gray's Manual of Botany, 8th (Centennial) Edition.

Appendix II

Recorded Birds of the Limestone Islands Nature Reserve

(N) - Nesting

Common Loon Gavia immer
Double-crested Cormorant (N) Phalacrocorax auritus
Canada Goose Branta canadensis
Brant Branta bernicla
Mallard Anas platyrhynchos
Black Duck Anas rubripes
Gadwall Anas strepera
Pintail (N) Anas acuta
Green-winged Teal Anas carolinenis
Blue-winged Teal Anas discors
American Widgeon Mareca americana
Common Goldeneye Bucephala clangula
White-winged Scoter Melanitta deglandi
Common Merganser (N) Mergus merganser
Red-breasted Merganser (N) Mergus serrator
Sharp-shinned Hawk Accipiter striatus
Marsh Hawk Circus cyaneus
Peregrine Falcon Falco peregrinus
American Kestrel Falco sparverius
Great Blue Heron (N) Ardea herodias
Black-crowned Night Heron (N) Nycticorax nycticorax
American Coot Fulica americana
Killdeer (N) Charadrius vociferus
Black-bellied Plover Squatarola squatarola
Common Snipe Capella gallinago
Spotted Sandpiper (N) Actitis macularia
Lesser Yellowlegs Totanus flavipes
Least Sandpiper Erolia minutilla
Dunlin Erolia alpina
Sanderling Crocethia alba
Wilson's Phalarope Steganopus tricolor
Herring Gull (N) Larus argentatus
Ring-billed Gull (N) Larus delawarensis
Bonaparte's Gull Larus philadelphia
Little Gull (N) Larus minutus
Common Tern (N) Sterna hirundo
Caspian Tern (N) Hydroprogne caspia
Rock Dove Columba livia
Great Horned Owl Bubo virginianus
Ruby-throated Hummingbird Archilochus colubris
Common Flicker Colaptes auratus
Red-headed Woodpecker Melanerpes erthrocephalus
Hairy Woodpecker Dendrocopos villosus
Eastern Kingbird Tyrannus tyrannus
Great Crested Flycatcher Myiarchus crinitus
Eastern Phoebe Sayornis phoebe
Least Flycatcher Empidonax minimus
Horned Lark Eremophila alpestris
Tree Swallow (N) Iridoprocne bicolor
Barn Swallow Hirundo rustica
Purple Martin Progne subis
Blue Jay Cyanocitta cristata
White-breasted Nuthatch Sitta carolinensis
Red-breasted Nuthatch Sitta canadensis
Brown Creeper Certhia familiaris
House Wren Troglodytes aedon
Gray Catbird Dumetella carolinensis
Wood Thrush Hylocichla mustelina
Hermit Thrush Hylocichla guttata
Swainson's Thrust Hylocichla ustulata
Veery Hylocichla fuscescens
Ruby-crowned Kinglet Regulus calendula
Golden-crowned Kinglet Regulus satrapo
Water Pipit Anthus spinoletta
Cedar Waxwing Bombycilla cedrorum
Starling Sturnus vulgaris
Red-eyed Vireo Vireo olivaceus
Philadelphia Vireo Vireo philadelphicus
Black-and-White Warbler Mniotilta varia
Golden-winged Warbler Vermivora chrysoptera
Tennessee Warbler Vermivora peregrina
Nashville Warbler Vermivora ruficapilla
Yellow Warbler Dendroica petechia
Magnolia Warbler Dendroica magnolia
Cape May Warbler Dendroica tigrina
Black-throated Blue Warbler Dendroica caerulescens
Yellow-rumped Warbler Dendroica coronata coronata
Black-throated Green Warbler Dendroica virens
Blackburnian Warbler Dendroica fusca
Chestnut-sided Warbler Dendroica pensylvanica
Bay-breasted Warbler Dendroica castanea
Palm Warbler Dendroica palmarum
Ovenbird Seiurus aurocapillus
Common Yellowthroat Geothlypis trichas
Wilson's Warbler Wilsonia pusilla
Canada Warbler Wilsonia canadensis
American Redstart Setophaga ruticilla
Bobolink Dolichonyx oryzivorus
Eastern Meadowlark Sturnella magna
Red-winged Blackbird (N) Agelaius phoeniceus
Northern Oriole Icterus galbula
Rusty Blackbird Euphagus carolinus
Common Grackle Quiscalus quiscula
Brown-headed Cowbird Molothrus ater
Scarlet Tanager Piranga olivacea
Rose-breasted Grosbeak Pheucticus ludovicianus
Evening Grosbeak Hesperiphona vespertina

Purple Finch *Carpodacus purpureus*
Dark-eyed Junco *Junco hyemalis*
Chipping Sparrow *Spizella passerina*
White-crowned Sparrow *Zonotrichia leucophrys*
White-throated Sparrow *Zonotrichia albicollis*
Lincoln's Sparrow *Melospiza lincolnii*
Song Sparrow *Melospiza melodia*